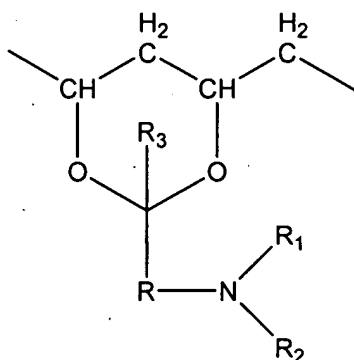
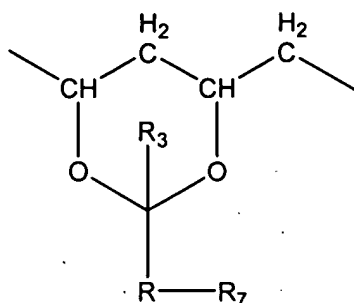


What is claimed is:

1. A polymerizable material for making an ophthalmic device, comprising: a water-soluble polyvinyl alcohol having crosslinkable groups; and a modifier in an amount sufficient to improve one or more physical properties of the ophthalmic device made from the polymerizable material, wherein the one or more physical properties are selected from the group consisting of stress at break ( $\text{N/mm}^2$ ), percentage of elongation at break, toughness or energy to break ( $\text{N}\cdot\text{mm}$ ), and susceptibility to fracture.
2. A polymerizable material of claim 1, wherein said modifier is selected from the group consisting of nanoparticles having a hydrophilic surface, a copolymer having hydrophobic groups or units for imparting at least one desired physical property to said ophthalmic device and hydrophilic groups or units in an amount sufficient to render the copolymer miscible with the polyvinyl alcohol, and mixtures thereof.
3. A polymerizable material of claim 2, wherein said water-soluble polyvinyl alcohol is a polyhydroxyl compound which has a weight average molecular weight of at least about 2000 and which comprises from about 0.5 to about 80%, based on the number of hydroxyl groups in the poly(vinyl alcohol), of units of the formula I, I and II, I and III, or I and II and III

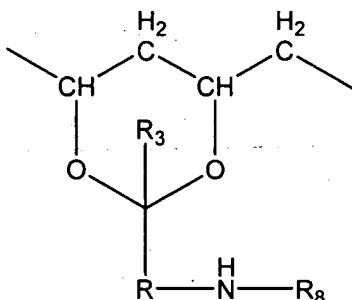


in which R is alkylene having up to 12 carbon atoms,  $R_1$  is hydrogen or lower alkyl,  $R_2$  is an olefinically unsaturated, electron-withdrawing, crosslinkable radical having up to 25 carbon atoms, and  $R_3$  is hydrogen, a  $C_1$ - $C_6$  alkyl group or a cycloalkyl group,



II

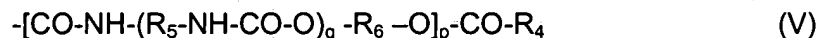
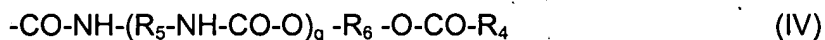
wherein R and R<sub>3</sub> are as defined above, and R<sub>7</sub> is a primary, secondary or tertiary amino group or a quaternary amino group of the formula N<sup>+</sup>(R')<sub>3</sub>X<sup>-</sup>, in which each R', independently of the others, is hydrogen or a C<sub>1</sub>-C<sub>4</sub> alkyl radical and X is HSO<sub>4</sub><sup>-</sup>, F<sup>-</sup>, Cl<sup>-</sup>, Br<sup>-</sup>, I<sup>-</sup>, CH<sub>3</sub>COO<sup>-</sup>, OH<sup>-</sup>, BF<sub>4</sub><sup>-</sup>, or H<sub>2</sub>PO<sub>4</sub><sup>-</sup>,



III

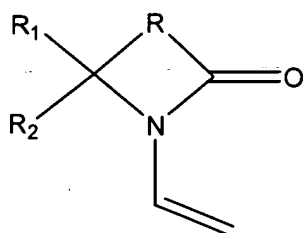
in which R and R<sub>3</sub> are as defined above, and R<sub>8</sub> is the radical of a monobasic, dibasic or tribasic, saturated or unsaturated, aliphatic or aromatic organic acid or sulfonic acid.

4. A polymerizable material of claim 3, wherein said water-soluble polyvinyl alcohol is a polyhydroxyl compound which has a molecular weight of at least about 2000 and which comprises from about 0.5 to about 80%, based on the number of hydroxyl groups in the poly(vinyl alcohol), of units of the formula I, wherein R<sub>2</sub> is a radical of formula IV or formula V



in which p and q, independently of one another, are zero or one, and R<sub>5</sub> and R<sub>6</sub>, independently of one another, are lower alkylene having 2 to 8 carbon atoms, arylene having 6 to 12 carbon atoms, a saturated bivalent cycloaliphatic group having 6 to 10 carbon atoms, arylenealkylene or alkylenearylene having 7 to 14 carbon atoms or arylenealkylenearylene having 13 to 16 carbon atoms, and in which R<sub>4</sub> is an olefinically unsaturated copolymerizable radical having 2 to 24 carbon atoms, preferably having 2 to 8 carbon atoms, more preferably having 2 to 4 carbon atoms.

5. A polymerizable material of claim 3, wherein said modifier is composed of the nanoparticles having a hydrophilic surface.
6. A polymerizable material of claim 5, wherein the nanoparticles are nano-sized silica fillers.
7. A polymerizable material of claim 3, wherein said modifier is composed of one or more copolymers each having hydrophobic groups or units for imparting at least one desired physical property to said ophthalmic device and hydrophilic groups or units in an amount sufficient to render the copolymer miscible with the crosslinkable polyvinyl alcohol.
8. A polymerizable material of claim 7, wherein said modifier is a N-vinyl lactam copolymer which is a copolymerization product of at least one N-vinyl lactam with one or more hydrophobic monomer, wherein said at least one N-vinyl lactam has a structure of formula (VI)

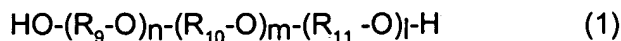


(VI)

- in which  $R_{19}$  is an alkylene di-radical having from 2 to 8 carbon atoms,  $R_{20}$  is hydrogen,  $C_1$ - $C_7$  alkyl, aryl having up to 10 carbon atoms, aralkyl or alkaryl having up to 14 carbon atoms, and  $R_{21}$  is hydrogen or lower alkyl having up to 7 carbon atoms.
9. A polymerizable material of claim 8, wherein said N-vinyl lactam is N-vinyl pyrrolidone.
  10. A polymerizable material of claim 7, wherein said modifier is a N,N-dialkylmethacrylamide copolymer which is a copolymerization product of a N,N-di- $C_2$ - $C_4$  alkyl methacrylamide with at least one hydrophobic monomer.
  11. A polymerizable material of claim 10, wherein the N,N-di- $C_2$ - $C_4$  alkyl methacrylamide is N,N-dimethylmethacrylamide.
  12. A polymerizable material of claim 7, wherein said modifier is a non-crosslinkable polyurethane having a molecular weight of at least about 2000, or a crosslinkable polyurethane.
  13. A polymerizable material of claim 12, wherein said non-crosslinkable polyurethane is the reaction product of an isocyanate-capped polyurethane with water and amine, wherein said crosslinkable polyurethane is the reaction product of the isocyanate-capped polyurethane with an ethylenically unsaturated amine (primary or secondary amine) or an

ethylenically unsaturated monohydroxy compound, wherein said isocyanate-capped polyurethane is a copolymerization product of

(a) at least one polyalkylene glycol of formula



wherein  $\text{R}_9$ ,  $\text{R}_{10}$ , and  $\text{R}_{11}$ , independently of one other, are each linear or branched  $\text{C}_2$ - $\text{C}_4$ -alkylene, and  $n$ ,  $m$  and  $l$ , independently of one another, are each a number from 0 to 100, wherein the sum of  $(n+m+l)$  is 5 to 100,

(b) at least one branching agent selected from the group consisting of

(i) a linear or branched aliphatic polyhydroxy compound of formula



wherein  $\text{R}_{12}$  is a linear or branched  $\text{C}_3$ - $\text{C}_{18}$  aliphatic multi-valent radical and  $x$  is a number  $\geq 3$ ,

(ii) a polyether polyol, which is the polymerization product of a compound of formula (2) and a glycol,

(iii) a polyester polyol, which is the polymerization product of a compound of formula (2), a dicarboxylic acid or a derivative thereof and a diol, and

(iv) a cycloaliphatic polyol selected from the group consisting of a  $\text{C}_5$ - $\text{C}_8$ -cycloalkane which is substituted by  $\geq 3$  hydroxy groups and which is unsubstituted by alkyl radical, a  $\text{C}_5$ - $\text{C}_8$ -cycloalkane which is substituted by  $\geq 3$  hydroxy groups and which is substituted by one or more  $\text{C}_1$ - $\text{C}_4$  alkyl radicals, and an unsubstituted mono- and disaccharide,

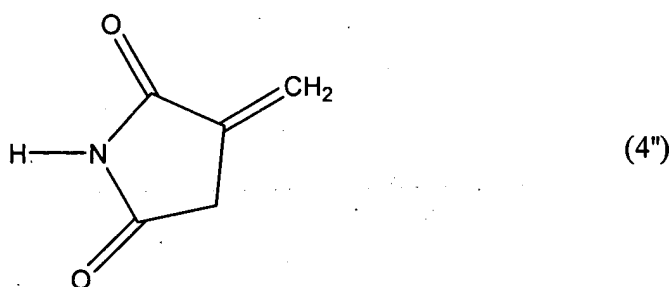
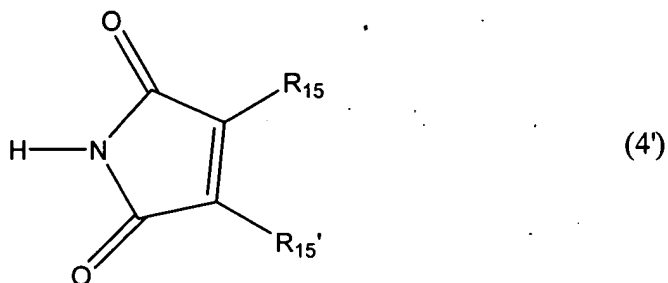
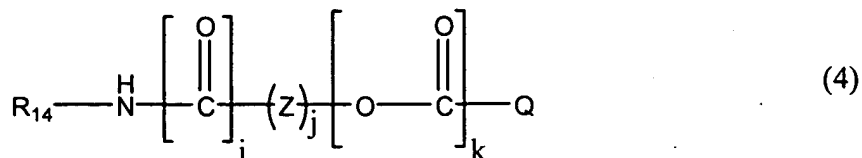
(v) an aralkyl polyol having at least three hydroxy  $\text{C}_1$ - $\text{C}_4$  alkyl radicals, and

(c) at least one di- or polyisocyanate of formula



wherein  $\text{R}_{13}$  the multivalent radical of a linear or branched  $\text{C}_3$ - $\text{C}_{24}$  aliphatic polyisocyanate, the multivalent radical of a  $\text{C}_3$ - $\text{C}_{24}$  cycloaliphatic or aliphatic-cycloaliphatic polyisocyanate, or the multivalent radical of a  $\text{C}_3$ - $\text{C}_{24}$  aromatic or araliphatic polyisocyanate, and  $y$  is a number from 2 to 6,

wherein said ethylenically unsaturated monohydroxy compound is a hydroxy-substituted lower alkylacrylate, a hydroxy-substituted lower alkylmethacrylate, a hydroxy-substituted lower alkyl-acrylamides, a hydroxy-substituted lower alkyl-methacrylamide, or a hydroxy-substituted lower alkylvinylether, wherein said ethylenically unsaturated amine has formula (4), (4') or (4'')



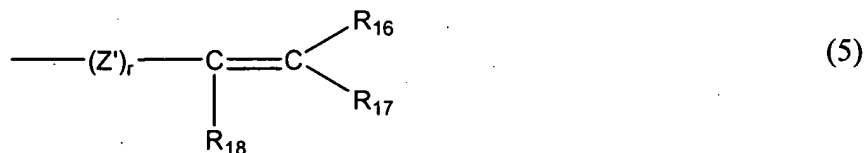
In which,  $i$ ,  $j$  and  $k$ , independent of one another, are 0 or 1;

$R_{14}$  is hydrogen, a linear or branched  $C_1$ - $C_{24}$  alkyl, a  $C_2$ - $C_{24}$  alkoxyalkyl, a  $C_2$ - $C_{24}$  alkylcarbonyl, a  $C_2$ - $C_{24}$  alkoxy-carbonyl, an unsubstituted or  $C_1$ - $C_4$  alkyl- or  $C_1$ - $C_4$  alkoxy-substituted  $C_6$ - $C_{10}$  aryl, a  $C_7$ - $C_{18}$  aralkyl, a  $C_{13}$ - $C_{22}$  arylalkylaryl, a  $C_3$ - $C_8$  cycloalkyl, a  $C_4$ - $C_{14}$  cycloalkylalkyl, a  $C_7$ - $C_{18}$  cycloalkylalkylcycloalkyl, a  $C_5$ - $C_{20}$  alkylcycloalkylalkyl, or an aliphatic-heterocyclic radical;

$Z$  is a  $C_1$ - $C_{12}$  alkylene radical, phenylene radical or  $C_7$ - $C_{12}$  aralkylene radical;

$R_{15}$  and  $R_{15}'$ , independently of each other, are hydrogen,  $C_1$ - $C_4$  alkyl or halogen; and

$Q$  is a radical of formula (5)



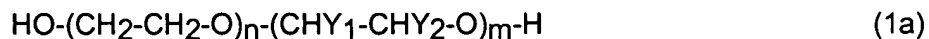
wherein  $r$  is the number 0 or 1,

each of  $R_{16}$  and  $R_{17}$  independently of the other is hydrogen,  $C_1$ - $C_4$  alkyl, phenyl, carboxy or halogen,

$R_{18}$  is hydrogen,  $C_1$ - $C_4$  alkyl or halogen, and

Z' is a linear or branched C<sub>1</sub>-C<sub>12</sub> alkylene, an unsubstituted phenylene, an C<sub>1</sub>-C<sub>4</sub> alkyl- or C<sub>1</sub>-C<sub>4</sub> alkoxy-substituted phenylene, or a C<sub>7</sub>-C<sub>12</sub> aralkylene.

14. A polymerizable material of claim 13, wherein component (a) consists of one or more polyalkylene glycols of formula (1a)



wherein one of radicals Y<sub>1</sub> and Y<sub>2</sub> signifies methyl and the other radical signifies hydrogen, and n and m, independently of one another, each denote a number from 0 to 50, wherein the sum of (n+m) is 8 to 50,

wherein component (b) consists of one or more linear or branched aliphatic polyhydroxy compounds of formula (2), in which x is a number from 3 to 8,

wherein component (c) consists of one or more diisocyanates of formula (3a)

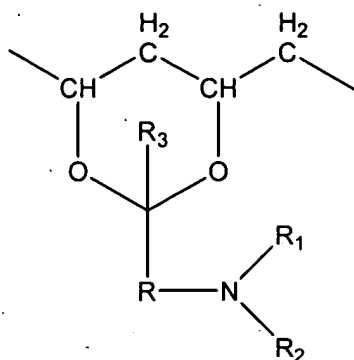


wherein R<sub>5</sub> is a linear or branched C<sub>3</sub>-C<sub>18</sub>-alkylene, an unsubstituted or C<sub>1</sub>-C<sub>4</sub>-alkyl-substituted or C<sub>1</sub>-C<sub>4</sub>-alkoxy-substituted C<sub>6</sub>-C<sub>10</sub>-arylene, a C<sub>7</sub>-C<sub>18</sub>-aralkylene, a C<sub>6</sub>-C<sub>10</sub>-arylene-C<sub>1</sub>-C<sub>2</sub>-alkylene-C<sub>6</sub>-C<sub>10</sub>-arylene, a C<sub>3</sub>-C<sub>8</sub>-cyclo-alkylene, a C<sub>3</sub>-C<sub>8</sub>-cycloalkylene-C<sub>1</sub>-C<sub>6</sub>-alkylene, a C<sub>3</sub>-C<sub>8</sub>-cycloalkylene-C<sub>1</sub>-C<sub>2</sub>-alkylene-C<sub>3</sub>-C<sub>8</sub>-cycloalkylene, or a C<sub>1</sub>-C<sub>6</sub>-alkylene-C<sub>3</sub>-C<sub>8</sub>-cycloalkylene-C<sub>1</sub>-C<sub>6</sub>-alkylene,

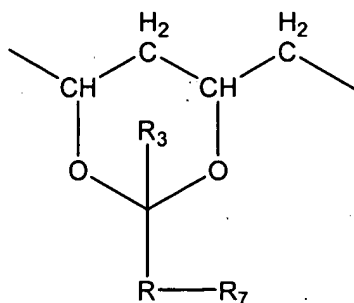
wherein said ethylenically unsaturated amine is selected from the group consisting of mono-C<sub>1</sub>-C<sub>4</sub> alkylamino-C<sub>1</sub>-C<sub>4</sub> alkyl-acrylates, mono-C<sub>1</sub>-C<sub>4</sub> alkylamino-C<sub>1</sub>-C<sub>4</sub> alkyl-methacrylates, di-C<sub>1</sub>-C<sub>4</sub> alkylamino-C<sub>1</sub>-C<sub>4</sub> alkyl-acrylates and di-C<sub>1</sub>-C<sub>4</sub> alkylamino-C<sub>1</sub>-C<sub>4</sub> alkyl-methacrylates, and wherein said ethylenically unsaturated hydroxy compound is selected from the group consisting of hydroxy-substituted C<sub>1</sub>-C<sub>6</sub> alkylacrylates and hydroxy-substituted C<sub>1</sub>-C<sub>6</sub> alkylmethacrylates.

15. A polymerizable material of claim 14, wherein said ethylenically unsaturated amine is 2-terbutylaminoethylmethacrylate or 2-terbutylaminoethylacrylate, wherein said ethylenically unsaturated hydroxy compound is 2-hydroxyethylmethacrylate or 2-hydroxyethylacrylate, wherein component (c) consists of a diisocyanate selected from the group consisting isophorone diisocyanate (IPDI), toluylene-2,4-diisocyanate (TDI), methylenebis(cyclohexyl-isocyanate), 1,6-diisocyanato-2,2,4-trimethyl-n-hexane (TMDI), methylenebis(phenyl-isocyanate) and hexamethylene-diisocyanate (HMDI).
16. A polymeric article obtained by curing a polymerizable material of claim 2 in a mold.
17. A polymeric article of claim 16, wherein said polymeric article is an ophthalmic device.

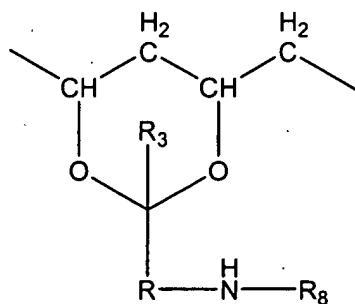
18. An ophthalmic device of claim 17, wherein said ophthalmic device is a contact lens.
19. A contact lens of claim 18, wherein said water-soluble polyvinyl alcohol is a polyhydroxyl compound which has a weight average molecular weight of at least about 2000 and which comprises from about 0.5 to about 80%, based on the number of hydroxyl groups in the poly(vinyl alcohol), of units of the formula I, I and II, I and III, or I and II and III



in which R is alkylene having up to 12 carbon atoms,  $R_1$  is hydrogen or lower alkyl,  $R_2$  is an olefinically unsaturated, electron-withdrawing, crosslinkable radical having up to 25 carbon atoms, and  $R_3$  is hydrogen, a  $C_1$ - $C_6$  alkyl group or a cycloalkyl group,

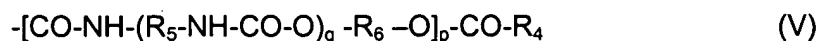
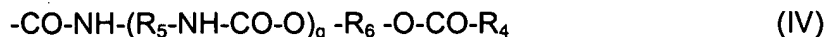


wherein R and  $R_3$  are as defined above, and  $R_7$  is a primary, secondary or tertiary amino group or a quaternary amino group of the formula  $N^+(R')_3X^-$ , in which each  $R'$ , independently of the others, is hydrogen or a  $C_1$ - $C_4$  alkyl radical and X is  $HSO_4^-$ ,  $F^-$ ,  $Cl^-$ ,  $Br^-$ ,  $I^-$ ,  $CH_3COO^-$ ,  $OH^-$ ,  $BF_4^-$ , or  $H_2PO_4^-$ ,

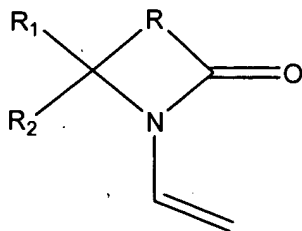


in which R and  $R_3$  are as defined above, and  $R_8$  is the radical of a monobasic, dibasic or tribasic, saturated or unsaturated, aliphatic or aromatic organic acid or sulfonic acid.

20. A contact lens of claim 19, wherein said water-soluble polyvinyl alcohol is a polyhydroxyl compound which has a molecular weight of at least about 2000 and which comprises from about 0.5 to about 80%, based on the number of hydroxyl groups in the poly(vinyl alcohol), of units of the formula I, wherein  $R_2$  is a radical of formula IV or formula V



- in which p and q, independently of one another, are zero or one, and  $R_5$  and  $R_6$ , independently of one another, are lower alkylene having 2 to 8 carbon atoms, arylene having 6 to 12 carbon atoms, a saturated bivalent cycloaliphatic group having 6 to 10 carbon atoms, arylenealkylene or alkylenearylene having 7 to 14 carbon atoms or arylenealkylenearylene having 13 to 16 carbon atoms, and in which  $R_4$  is an olefinically unsaturated copolymerizable radical having 2 to 24 carbon atoms, preferably having 2 to 8 carbon atoms, more preferably having 2 to 4 carbon atoms.
21. A contact lens of claim 19, wherein said modifier is composed of the nanoparticles having a hydrophilic surface.
22. A contact lens of claim 21, wherein the nanoparticles are nano-sized silica fillers.
23. A contact lens of claim 19, wherein said modifier is composed of one or more copolymers each having hydrophobic groups or units for imparting at least one desired physical property to said ophthalmic device and hydrophilic groups or units in an amount sufficient to render the copolymer miscible with the crosslinkable polyvinyl alcohol.
24. A contact lens of claim 23, wherein said modifier is a N-vinyl lactam copolymer which is a copolymerization product of at least one N-vinyl lactam with one or more hydrophobic monomer, wherein said at least one N-vinyl lactam has a structure of formula (VI)

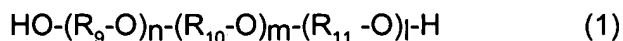


(VI)

- in which  $R_{19}$  is an alkylene di-radical having from 2 to 8 carbon atoms,  $R_{20}$  is hydrogen,  $C_1$ - $C_7$  alkyl, aryl having up to 10 carbon atoms, aralkyl or alkaryl having up to 14 carbon atoms, and  $R_{21}$  is hydrogen or lower alkyl having up to 7 carbon atoms.
25. A contact lens of claim 24, wherein said N-vinyl lactam is N-vinyl pyrrolidone.



26. A contact lens of claim 23, wherein said modifier is a N,N-dialkylmethacrylamide copolymer which is a copolymerization product of a N,N-di-C<sub>2</sub>-C<sub>4</sub> alkyl methacrylamide with at least one hydrophobic monomer.
27. A contact lens of claim 26, wherein the N,N-di-C<sub>2</sub>-C<sub>4</sub> alkyl methacrylamide is N,N-dimethylmethacrylamide.
28. A contact lens of claim 23, wherein said modifier is a non-crosslinkable polyurethane having a molecular weight of at least about 2000, or a crosslinkable polyurethane.
29. A contact lens of claim 28, wherein said non-crosslinkable polyurethane is the reaction product of an isocyanate-capped polyurethane with water and amine, wherein said crosslinkable polyurethane is the reaction product of the isocyanate-capped polyurethane with an ethylenically unsaturated amine (primary or secondary amine) or an ethylenically unsaturated monohydroxy compound, wherein said isocyanate-capped polyurethane is a copolymerization product of
- (a) at least one polyalkylene glycol of formula



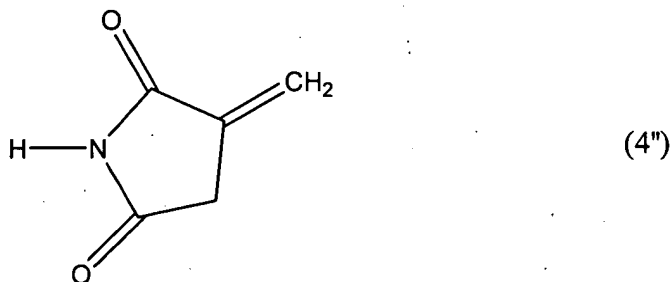
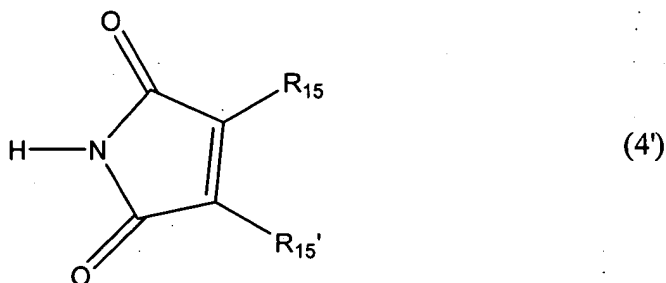
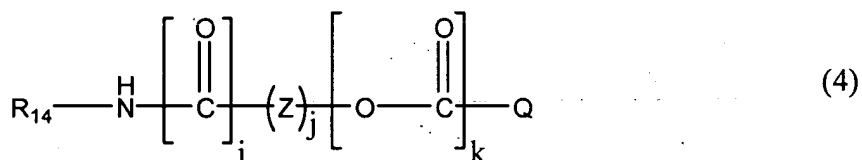
wherein R<sub>9</sub>, R<sub>10</sub>, and R<sub>11</sub>, independently of one other, are each linear or branched C<sub>2</sub>-C<sub>4</sub>-alkylene, and n, m and l, independently of one another, are each a number from 0 to 100, wherein the sum of (n+m+l) is 5 to 100,

- (b) at least one branching agent selected from the group consisting of
- (i) a linear or branched aliphatic polyhydroxy compound of formula
 
$$\text{R}_{12}-(\text{OH})_x \quad (2),$$
 wherein R<sub>12</sub> is a linear or branched C<sub>3</sub>-C<sub>18</sub> aliphatic multi-valent radical and x is a number  $\geq 3$ ,
  - (ii) a polyether polyol, which is the polymerization product of a compound of formula (2) and a glycol,
  - (iii) a polyester polyol, which is the polymerization product of a compound of formula (2), a dicarboxylic acid or a derivative thereof and a diol, and
  - (iv) a cycloaliphatic polyol selected from the group consisting of a C<sub>5</sub>-C<sub>8</sub>-cycloalkane which is substituted by  $\geq 3$  hydroxy groups and which is unsubstituted by alkyl radical, a C<sub>5</sub>-C<sub>8</sub>-cycloalkane which is substituted by  $\geq 3$  hydroxy groups and which is substituted by one or more C<sub>1</sub>-C<sub>4</sub> alkyl radicals, and an unsubstituted mono- and disaccharide,
  - (v) an aralkyl polyol having at least three hydroxy C<sub>1</sub>-C<sub>4</sub> alkyl radicals, and

(c) at least one di- or polyisocyanate of formula



wherein  $R_{13}$  the multivalent radical of a linear or branched  $C_3$ - $C_{24}$  aliphatic polyisocyanate, the multivalent radical of a  $C_3$ - $C_{24}$  cycloaliphatic or aliphatic-cycloaliphatic polyisocyanate, or the multivalent radical of a  $C_3$ - $C_{24}$  aromatic or araliphatic polyisocyanate, and  $y$  is a number from 2 to 6,  
wherein said ethylenically unsaturated monohydroxy compound is a hydroxy-substituted lower alkylacrylate, a hydroxy-substituted lower alkylmethacrylate, a hydroxy-substituted lower alkyl-acrylamides, a hydroxy-substituted lower alkyl-methacrylamide, or a hydroxy-substituted lower alkylvinylether, wherein said ethylenically unsaturated amine has formula (4), (4') or (4'')



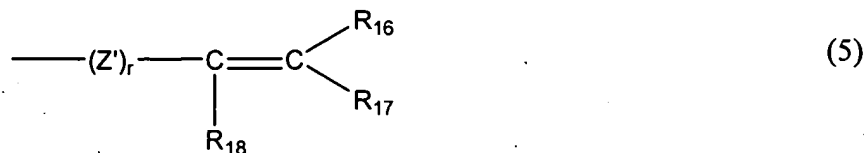
In which,  $i$ ,  $j$  and  $k$ , independent of one another, are 0 or 1;

$R_{14}$  is hydrogen, a linear or branched  $C_1$ - $C_{24}$  alkyl, a  $C_2$ - $C_{24}$  alkoxyalkyl, a  $C_2$ - $C_{24}$  alkylcarbonyl, a  $C_2$ - $C_{24}$  alkoxy carbonyl, an unsubstituted or  $C_1$ - $C_4$  alkyl- or  $C_1$ - $C_4$  alkoxy-substituted  $C_6$ - $C_{10}$  aryl, a  $C_7$ - $C_{18}$  aralkyl, a  $C_{13}$ - $C_{22}$  arylalkylaryl, a  $C_3$ - $C_8$  cycloalkyl, a  $C_4$ - $C_{14}$  cycloalkylalkyl, a  $C_7$ - $C_{18}$  cycloalkylalkylcycloalkyl, a  $C_5$ - $C_{20}$  alkylcycloalkylalkyl, or an aliphatic-heterocyclic radical;

$Z$  is a  $C_1$ - $C_{12}$  alkylene radical, phenylene radical or  $C_7$ - $C_{12}$  aralkylene radical;

$R_{15}$  and  $R_{15}'$ , independently of each other, are hydrogen,  $C_1$ - $C_4$  alkyl or halogen;  
and

Q is a radical of formula (5)



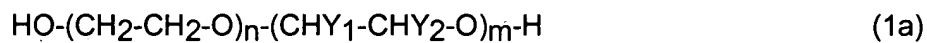
wherein  $r$  is the number 0 or 1,

each of  $R_{16}$  and  $R_{17}$  independently of the other is hydrogen,  $C_1$ - $C_4$  alkyl, phenyl, carboxy or halogen,

$R_{18}$  is hydrogen,  $C_1$ - $C_4$  alkyl or halogen, and

$Z'$  is a linear or branched  $C_1$ - $C_{12}$  alkylene, an unsubstituted phenylene, an  $C_1$ - $C_4$  alkyl- or  $C_1$ - $C_4$  alkoxy-substituted phenylene, or a  $C_7$ - $C_{12}$  aralkylene.

30. A contact lens of claim 29, wherein component (a) consists of one or more polyalkylene glycols of formula (1a)



wherein one of radicals  $Y_1$  and  $Y_2$  signifies methyl and the other radical signifies hydrogen, and  $n$  and  $m$ , independently of one another, each denote a number from 0 to 50, wherein the sum of  $(n+m)$  is 8 to 50,

wherein component (b) consists of one or more linear or branched aliphatic polyhydroxy compounds of formula (2), in which  $x$  is a number from 3 to 8,

wherein component (c) consists of one or more diisocyanates of formula (3a)

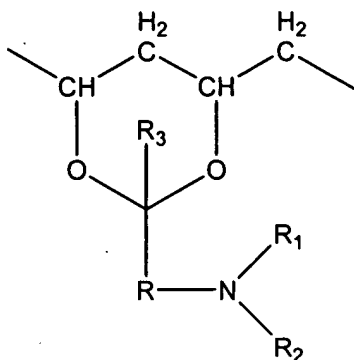


wherein  $R_5$  is a linear or branched  $C_3$ - $C_{18}$ -alkylene, an unsubstituted or  $C_1$ - $C_4$ -alkyl-substituted or  $C_1$ - $C_4$ -alkoxy-substituted  $C_6$ - $C_{10}$ -arylene, a  $C_7$ - $C_{18}$ -aralkylene, a  $C_6$ - $C_{10}$ -arylene- $C_1$ - $C_2$ -alkylene- $C_6$ - $C_{10}$ -arylene, a  $C_3$ - $C_8$ -cyclo-alkylene, a  $C_3$ - $C_8$ -cycloalkylene- $C_1$ - $C_6$ -alkylene, a  $C_3$ - $C_8$ -cycloalkylene- $C_1$ - $C_2$ -alkylene- $C_3$ - $C_8$ -cycloalkylene, or a  $C_1$ - $C_6$ -alkylene- $C_3$ - $C_8$ -cycloalkylene- $C_1$ - $C_6$ -alkylene,

wherein said ethylenically unsaturated amine is selected from the group consisting of mono- $C_1$ - $C_4$  alkylamino- $C_1$ - $C_4$  alkyl-acrylates, mono- $C_1$ - $C_4$  alkylamino- $C_1$ - $C_4$  alkyl-methacrylates, di-  $C_1$ - $C_4$  alkylamino-  $C_1$ - $C_4$  alkyl-acrylates and di-  $C_1$ - $C_4$  alkylamino-  $C_1$ - $C_4$  alkyl-methacrylates, and wherein said ethylenically unsaturated hydroxy compound is

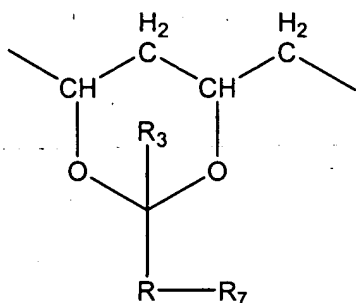
selected from the group consisting of hydroxy-substituted C<sub>1</sub>-C<sub>6</sub> alkylacrylates and hydroxy-substituted C<sub>1</sub>-C<sub>6</sub> alkylmethacrylates.

31. A contact lens of claim 30, wherein said ethylenically unsaturated amine is 2-terbutylaminoethylmethacrylate or 2-terbutylaminoethylacrylate, wherein said ethylenically unsaturated hydroxy compound is 2-hydroxyethylmethacrylate or 2-hydroxyethylacrylate, wherein component (c) consists of a diisocyanate selected from the group consisting isophorone diisocyanate (IPDI), toluylene-2,4-diisocyanate (TDI), methylenebis(cyclohexyl-isocyanate), 1,6-diisocyanato-2,2,4-trimethyl-n-hexane (TMDI), methylenebis(phenyl-isocyanate) and hexamethylene-diisocyanate (HMDI).
32. A method for making an ophthalmic device, comprising the steps of:
  - (I) introducing a polymerizable material comprising a water-soluble polyvinyl alcohol having crosslinkable groups, a modifier in an amount sufficient to improve one or more physical properties of the ophthalmic device made from the polymerizable material, and optionally a photo-initiator, into a mold, wherein said modifier is selected from the group consisting of nanoparticles having a hydrophilic surface, a copolymer having hydrophobic groups or units for imparting at least one desired physical property to said ophthalmic device and hydrophilic groups or units in an amount sufficient to render the copolymer miscible with the polyvinyl alcohol, and mixtures thereof, wherein the one or more physical properties are selected from the group consisting of stress at break (N/mm<sup>2</sup>), percentage of elongation at break, toughness or energy to break (N-mm), and susceptibility to fracture;
  - (II) crosslinking by actinic radiation the polymerizable material; and
  - (III) opening the mold so that the ophthalmic device can be removed from the mold.
33. A method of claim 32, wherein said water-soluble polyvinyl alcohol is a polyhydroxyl compound which has a weight average molecular weight of at least about 2000 and which comprises from about 0.5 to about 80%, based on the number of hydroxyl groups in the poly(vinyl alcohol), of units of the formula I, I and II, I and III, or I and II and III



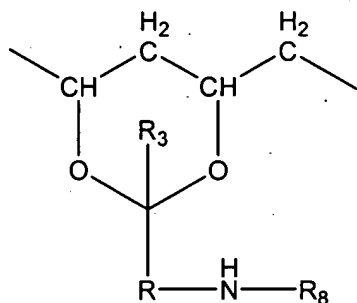
I

in which R is alkylene having up to 12 carbon atoms, R<sub>1</sub> is hydrogen or lower alkyl, R<sub>2</sub> is an olefinically unsaturated, electron-withdrawing, crosslinkable radical having up to 25 carbon atoms, and R<sub>3</sub> is hydrogen, a C<sub>1</sub>-C<sub>6</sub> alkyl group or a cycloalkyl group,



II

wherein R and R<sub>3</sub> are as defined above, and R<sub>7</sub> is a primary, secondary or tertiary amino group or a quaternary amino group of the formula N<sup>+</sup>(R')<sub>3</sub>X<sup>-</sup>, in which each R', independently of the others, is hydrogen or a C<sub>1</sub>-C<sub>4</sub> alkyl radical and X is HSO<sub>4</sub><sup>-</sup>, F<sup>-</sup>, Cl<sup>-</sup>, Br<sup>-</sup>, I<sup>-</sup>, CH<sub>3</sub>COO<sup>-</sup>, OH<sup>-</sup>, BF<sub>4</sub><sup>-</sup>, or H<sub>2</sub>PO<sub>4</sub><sup>-</sup>,



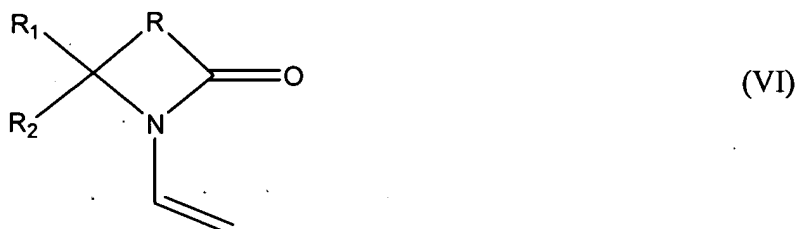
III

in which R and R<sub>3</sub> are as defined above, and R<sub>8</sub> is the radical of a monobasic, dibasic or tribasic, saturated or unsaturated, aliphatic or aromatic organic acid or sulfonic acid.

34. A method of claim 33, wherein said modifier is composed of the nanoparticles having a hydrophilic surface.
35. A method of claim 33, wherein said modifier is composed of one or more copolymers each having hydrophobic groups or units for imparting at least one desired physical

property to said ophthalmic device and hydrophilic groups or units in an amount sufficient to render the copolymer miscible with the crosslinkable polyvinyl alcohol.

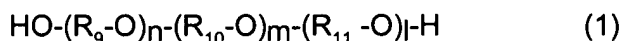
36. A method of claim 35, wherein said modifier is a N-vinyl lactam copolymer which is a copolymerization product of at least one N-vinyl lactam with one or more hydrophobic monomer, wherein said at least one N-vinyl lactam has a structure of formula (VI)



in which  $R_{19}$  is an alkylene di-radical having from 2 to 8 carbon atoms,  $R_{20}$  is hydrogen,  $C_1$ - $C_7$  alkyl, aryl having up to 10 carbon atoms, aralkyl or alkaryl having up to 14 carbon atoms, and  $R_{21}$  is hydrogen or lower alkyl having up to 7 carbon atoms.

37. A method of claim 35, wherein said modifier is a N,N-dialkylmethacrylamide copolymer which is a copolymerization product of a N,N-di- $C_2$ - $C_4$  alkyl methacrylamide with at least one hydrophobic monomer.
38. A method of claim 35, wherein said modifier is a non-crosslinkable polyurethane having a molecular weight of at least about 2000, or a crosslinkable polyurethane.
39. A method of claim 38, wherein said non-crosslinkable polyurethane is the reaction product of an isocyanate-capped polyurethane with water and amine, wherein said crosslinkable polyurethane is the reaction product of the isocyanate-capped polyurethane with an ethylenically unsaturated amine (primary or secondary amine) or an ethylenically unsaturated monohydroxy compound, wherein said isocyanate-capped polyurethane is a copolymerization product of

- (a) at least one polyalkylene glycol of formula



wherein  $R_9$ ,  $R_{10}$ , and  $R_{11}$ , independently of one other, are each linear or branched  $C_2$ - $C_4$ -alkylene, and  $n$ ,  $m$  and  $l$ , independently of one another, are each a number from 0 to 100, wherein the sum of  $(n+m+l)$  is 5 to 100,

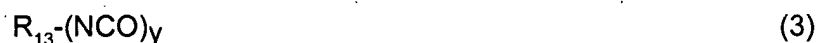
- (b) at least one branching agent selected from the group consisting of

- (i) a linear or branched aliphatic polyhydroxy compound of formula



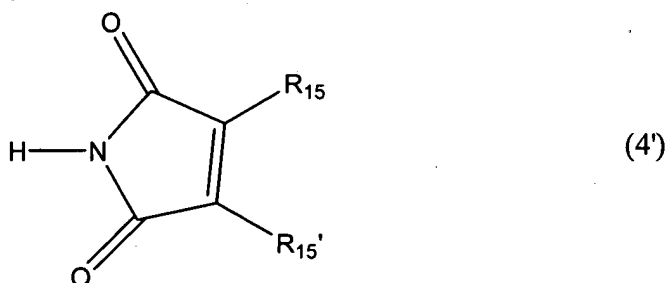
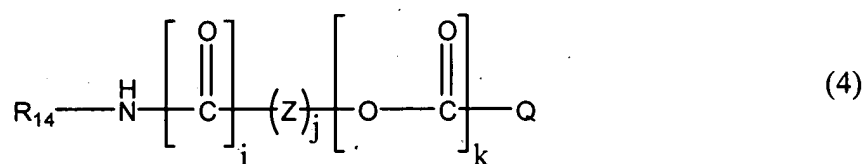
wherein  $R_{12}$  is a linear or branched  $C_3$ - $C_{18}$  aliphatic multi-valent radical and  $x$  is a number  $\geq 3$ ,

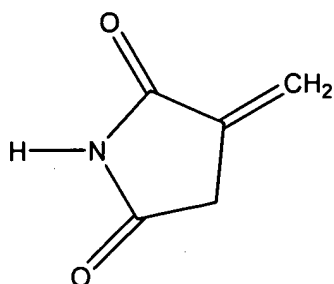
- (ii) a polyether polyol, which is the polymerization product of a compound of formula (2) and a glycol,
- (iii) a polyester polyol, which is the polymerization product of a compound of formula (2), a dicarboxylic acid or a derivative thereof and a diol, and
- (iv) a cycloaliphatic polyol selected from the group consisting of a C<sub>5</sub>-C<sub>8</sub>-cycloalkane which is substituted by  $\geq 3$  hydroxy groups and which is unsubstituted by alkyl radical, a C<sub>5</sub>-C<sub>8</sub>-cycloalkane which is substituted by  $\geq 3$  hydroxy groups and which is substituted by one or more C<sub>1</sub>-C<sub>4</sub> alkyl radicals, and an unsubstituted mono- and disaccharide,
- (v) an aralkyl polyol having at least three hydroxy C<sub>1</sub>-C<sub>4</sub> alkyl radicals, and
- (c) at least one di- or polyisocyanate of formula



wherein  $R_{13}$  the multivalent radical of a linear or branched C<sub>3</sub>-C<sub>24</sub> aliphatic polyisocyanate, the multivalent radical of a C<sub>3</sub>-C<sub>24</sub> cycloaliphatic or aliphatic-cycloaliphatic polyisocyanate, or the multivalent radical of a C<sub>3</sub>-C<sub>24</sub> aromatic or araliphatic polyisocyanate, and y is a number from 2 to 6,

wherein said ethylenically unsaturated monohydroxy compound is a hydroxy-substituted lower alkylacrylate, a hydroxy-substituted lower alkylmethacrylate, a hydroxy-substituted lower alkyl-acrylamides, a hydroxy-substituted lower alkyl-methacrylamide, or a hydroxy-substituted lower alkylvinylether, wherein said ethylenically unsaturated amine has formula (4), (4') or (4'')





(4'')

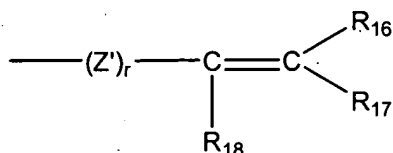
In which, I, j and k, independent of one another, are 0 or 1;

R<sub>14</sub> is hydrogen, a linear or branched C<sub>1</sub>-C<sub>24</sub> alkyl, a C<sub>2</sub>-C<sub>24</sub> alkoxyalkyl, a C<sub>2</sub>-C<sub>24</sub> alkylcarbonyl, a C<sub>2</sub>-C<sub>24</sub> alkoxy-carbonyl, an unsubstituted or C<sub>1</sub>-C<sub>4</sub> alkyl- or C<sub>1</sub>-C<sub>4</sub> alkoxy-substituted C<sub>6</sub>-C<sub>10</sub> aryl, a C<sub>7</sub>-C<sub>18</sub> aralkyl, a C<sub>13</sub>-C<sub>22</sub> arylalkylaryl, a C<sub>3</sub>-C<sub>8</sub> cycloalkyl, a C<sub>4</sub>-C<sub>14</sub> cycloalkylalkyl, a C<sub>7</sub>-C<sub>18</sub> cycloalkylalkylcycloalkyl, a C<sub>5</sub>-C<sub>20</sub> alkylcycloalkylalkyl, or an aliphatic-heterocyclic radical;

Z is a C<sub>1</sub>-C<sub>12</sub> alkylene radical, phenylene radical or C<sub>7</sub>-C<sub>12</sub> aralkylene radical;

R<sub>15</sub> and R<sub>15'</sub>, independently of each other, are hydrogen, C<sub>1</sub>-C<sub>4</sub> alkyl or halogen; and

Q is a radical of formula (5)



(5)

wherein r is the number 0 or 1,

each of R<sub>16</sub> and R<sub>17</sub> independently of the other is hydrogen, C<sub>1</sub>-C<sub>4</sub> alkyl, phenyl, carboxy or halogen,

R<sub>18</sub> is hydrogen, C<sub>1</sub>-C<sub>4</sub> alkyl or halogen, and

Z' is a linear or branched C<sub>1</sub>-C<sub>12</sub> alkylene, an unsubstituted phenylene, an C<sub>1</sub>-C<sub>4</sub> alkyl- or C<sub>1</sub>-C<sub>4</sub> alkoxy-substituted phenylene, or a C<sub>7</sub>-C<sub>12</sub> aralkylene.

40. A method of claim 39, wherein component (a) consists of one or more polyalkylene glycols of formula (1a)



wherein one of radicals Y<sub>1</sub> and Y<sub>2</sub> signifies methyl and the other radical signifies hydrogen, and n and m, independently of one another, each denote a number from 0 to 50, wherein the sum of (n+m) is 8 to 50,



wherein component (b) consists of one or more linear or branched aliphatic polyhydroxy compounds of formula (2), in which x is a number from 3 to 8,

wherein component (c) consists of one or more diisocyanates of formula (3a)



wherein  $R_5$  is a linear or branched C<sub>3</sub>-C<sub>18</sub>-alkylene, an unsubstituted or C<sub>1</sub>-C<sub>4</sub>-alkyl-substituted or C<sub>1</sub>-C<sub>4</sub>-alkoxy-substituted C<sub>6</sub>-C<sub>10</sub>-arylene, a C<sub>7</sub>-C<sub>18</sub>-aralkylene, a C<sub>6</sub>-C<sub>10</sub>-arylene-C<sub>1</sub>-C<sub>2</sub>-alkylene-C<sub>6</sub>-C<sub>10</sub>-arylene, a C<sub>3</sub>-C<sub>8</sub>-cyclo-alkylene, a C<sub>3</sub>-C<sub>8</sub>-cycloalkylene-C<sub>1</sub>-C<sub>6</sub>-alkylene, a C<sub>3</sub>-C<sub>8</sub>-cycloalkylene-C<sub>1</sub>-C<sub>2</sub>-alkylene-C<sub>3</sub>-C<sub>8</sub>-cycloalkylene, or a C<sub>1</sub>-C<sub>6</sub>-alkylene-C<sub>3</sub>-C<sub>8</sub>-cycloalkylene-C<sub>1</sub>-C<sub>6</sub>-alkylene,

wherein said ethylenically unsaturated amine is selected from the group consisting of mono-C<sub>1</sub>-C<sub>4</sub> alkylamino-C<sub>1</sub>-C<sub>4</sub> alkyl-acrylates, mono-C<sub>1</sub>-C<sub>4</sub> alkylamino-C<sub>1</sub>-C<sub>4</sub> alkyl-methacrylates, di-C<sub>1</sub>-C<sub>4</sub> alkylamino-C<sub>1</sub>-C<sub>4</sub> alkyl-acrylates and di-C<sub>1</sub>-C<sub>4</sub> alkylamino-C<sub>1</sub>-C<sub>4</sub> alkyl-methacrylates, and wherein said ethylenically unsaturated hydroxy compound is selected from the group consisting of hydroxy-substituted C<sub>1</sub>-C<sub>6</sub> alkylacrylates and hydroxy-substituted C<sub>1</sub>-C<sub>6</sub> alkylmethacrylates.

41. A method of claim 40, wherein said ethylenically unsaturated amine is 2-terbutylaminoethylmethacrylate or 2-terbutylaminoethylacrylate, wherein said ethylenically unsaturated hydroxy compound is 2-hydroxyethylmethacrylate or 2-hydroxyethylacrylate, wherein component (c) consists of a diisocyanate selected from the group consisting isophorone diisocyanate (IPDI), toluylene-2,4-diisocyanate (TDI), methylenebis(cyclohexyl-isocyanate), 1,6-diisocyanato-2,2,4-trimethyl-n-hexane (TMDI), methylenebis(phenyl-isocyanate) and hexamethylene-diisocyanate (HMDI).
42. A method for modifying one or more physical properties of a hydrogel article obtained from the polymerization of a crosslinkable polymer, comprising the steps of:
  - (I) adding, into a solution of said crosslinkable polymer, a modifier in an amount sufficient to modify said one or more physical properties of said polymeric article, wherein said modifier is selected from the group consisting of nanoparticles having a hydrophilic surface, a copolymer having hydrophobic groups or units for imparting at least one desired physical property to said hydrogel article and hydrophilic groups or units in an amount sufficient to render it miscible with the crosslinkable polymer, and mixtures thereof;
  - (II) mixing thoroughly said modifier and the crosslinkable polymer; and

(III) crosslinking said crosslinkable polymer in the presence of the modifier to obtain said hydrogel article, wherein the one or more physical properties are selected from the group consisting of stress at break ( $\text{N/mm}^2$ ), percentage of elongation at break, toughness or energy to break ( $\text{N}\cdot\text{mm}$ ), and susceptibility to fracture.

43. A method of claim 42, wherein said modifier is composed of the nanoparticles having a hydrophilic surface.
44. A method of claim 43, wherein said modifier is composed of the nanoparticles having a hydrophilic surface.
45. A method of claim 42, wherein said modifier is composed of one or more copolymers each having hydrophobic groups or units for imparting at least one desired physical property to said ophthalmic device and hydrophilic groups or units in an amount sufficient to render the copolymer miscible with the crosslinkable polymer.
46. A method of claim 35, wherein each of said one or more copolymers is a polymerization product of at least one hydrophilic monomer and at least one hydrophobic monomer, wherein said hydrophilic is present in an amount sufficient to impart a desired miscibility with the crosslinkable polymer.